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805 Third Avenue
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Docket No: 2309/03390

Date: March 22, 1999

Hon. Commissioner of
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Washington, DC 20231

Sir:

Enclosed please find an application for United States patent as identified below:

Inventor/s (name ALL inventors): Yoshihisa **FUJIOKA**, Satoshi **NOZAKI**,
Ichiro **WADA** and Takashi **MAENO**

Title: **ABSORBENT ARTICLE FOR PREVENTION OF SIDEWARD LEAK**

including the items indicated:

1. Specification and 20 claims: 2 indep.; 18 dep.; 0 multiple dep.
2. ☒ Declaration and power of attorney
3. ☐ Formal drawings, sheets (Figs.)
☒ Informal drawings, 8 sheets (Figs. 1-9)
4. ☒ Assignment for recording to: **UNI-CHARM CORPORATION**
5. ☐ Verified Statement Claiming Small Entity Status
6. ☐ Check in amount of \$800.00, (\$760.00 filing; \$40.00 recording; \$ surcharge)
(See attached **Fee Computation Sheet**)
7. ☐ Preliminary Amendment.

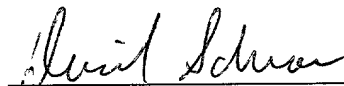
8. ☐ Please amend the description by inserting the following paragraph after the line containing the title on page 1:
"This patent application claims the priority of U.S. provisional patent application No. 60/_____, which is incorporated herein by reference."

Priority is claimed for this application, corresponding application/s having been filed as follows:

Country:	Japan
Number:	74057/98, 74076/98 and 319136/98
Date:	03/23/98, 03/23/98 and 11/10/98, respectively

The priority documents ☐ are enclosed
☒ will follow.

Respectfully submitted,



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PATENT FEE COMPUTATION SHEET

	No. of Claims Presented	Extra Claims Previously Paid For	Number of Extra Claims	Rate
Basic Fee				\$760.00
Total Claims	20 - 20	- 0 = 0	x \$18.00	\$0.00
Independent Claims	2 - 3	- 0 = 0	x \$78.00	\$0.00
Multiple Dependent Claims		0 - if so, add	\$260.00	\$0.00
Surcharge for late submission of filing fee and/or declaration (\$130.00)				\$0.00
SUBTOTAL				\$760.00
<input type="checkbox"/> Small Entity REDUCTION (Half of Subtotal)				\$0.00
Fee for recordation of assignment (\$40.00)				\$40.00
Charge for filing non-English language application (\$130.00)				\$0.00
TOTAL				\$800.00

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ABSORBENT ARTICLE FOR PREVENTION OF SIDEWARD LEAKFIELD OF THE INVENTION

The present invention relates to an absorbent article, including urine-absorbent pads, which is used inside a disposable diaper, and a sanitary napkin which is laid on top of the article to provide an absorbent article which exhibits excellent liquid-absorbing properties.

BACKGROUND OF THE INVENTION

A common means for caring for individuals suffering from incontinence is the use of an absorbent article, such as urine-absorbent pad, worn inside a disposable diaper. A conventional urine-absorbent pad contains a facing layer and a backing layer, with an absorbent core interposed between the layers. The facing layer, which faces the wearer in use, is liquid-permeable. The backing layer, which faces the disposable diaper in use, is liquid-impermeable. The absorbent core is formed from crushed pulp or a mixture of crushed pulp and super absorbent polymer (SAP). In addition, the urine-absorbent pad has an adhesive layer which sticks to the inside of the disposable diaper so as to prevent the urine-absorbent pad from slipping out of place in the disposable diaper.

The urine-absorbent pad receives a liquid insult directly in the case of an incontinence episode, and has the capacity to retain an amount of urine excreted by an adult during one or two episodes. The pad must be replaced as it is saturated with urine, which depends on the frequency of episodes, in order to prevent liquid from moving to the disposable diaper. Thus, it is possible to avoid the replacement of the disposable diaper by frequently changing the wet pad. However, this is not always possible, such as during periods of sleep, when the urine-absorbent pad is left in place for a long time. After repeated liquid insults, the urine-absorbent pad cannot absorb additional liquid, which results in excess liquid leaking from the pad.

The problem is that the excess liquid flows to the side or periphery

(which is in contact with the groin) rather than to the center of the disposable diaper (absorbent area of the disposable diaper), because the backing layer of the urine-absorbent pad is impermeable to liquid and faces the center of the disposable diaper. The periphery of the conventional disposable diaper does not sufficiently absorb urine, thereby causing it to leak at the sides of the diaper, which results in wet clothes or sheets. This same problem also occurs if two sanitary napkins are worn together on top of each other.

SUMMARY OF THE INVENTION

The present invention provides an absorbent article that prevents liquid from leaking from the sides of the article.

The invention further provides an absorbent article which efficiently absorbs liquid when used in combination with another absorbent article.

In one embodiment of the invention, a first absorbent article is worn inside of a second absorbent article, wherein the first article contains a liquid-permeable facing layer which is in contact with the wearer, a backing layer which is in contact with a second absorbent article, the backing layer being formed from a liquid-impermeable sheet and having at least one opening made therein, and an absorbent core interposed between the facing layer and the backing layer.

In another embodiment of the invention, a first absorbent article is worn inside of a second absorbent article, wherein the first article contains a liquid-permeable facing layer which is in contact with the wearer, and a liquid-permeable backing layer which is in contact with the second article, and an absorbent core interposed between the facing layer and the backing layer.

The absorbent article of the present invention is designed to be worn inside of another absorbent article such as a disposable diaper, urine-absorbent pad, or sanitary napkin. The absorbent article absorbs a certain amount of liquid by the absorbent core but permits excess liquid which remains unabsorbed by the core to pass through the backing layer for absorption by another absorbent article such as a

disposable diaper. Accordingly, the leakage of excess liquid from the side of the absorbent article is prevented.

The absorbent article can be modified such that the backing layer is provided with a liquid-impermeable covering sheet that can be removed at any time when necessary. With the covering sheet on, it stops the flow of urine; with the covering sheet removed, it permits the passage of urine. When frequent changing of the absorbent article is possible, such as during the daytime, it may be used with the covering sheet attached to prevent frequent replacement of the second absorbent article, such as a disposable diaper, used in combination with absorbent article. When frequent changing is unlikely, such as during periods of sleep, the absorbent article may be used with the covering sheet removed, thereby absorbing liquid efficiently and securely in combination with another absorbent article.

The absorbent article can be modified such that the backing layer is provided with an adhesive means for fastening the backing layer to another absorbent article. In such a structure, the absorbent article will not slip out of place, and the movement of liquid to the other absorbent article is ensured.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1(A) is a perspective view showing a urine-absorbent pad as an example of an absorbent article according to the invention.

Fig. 1(B) is a plan view of the urine-absorbent pad shown in **Fig. 1(A)**, as viewed from a backing layer, with a covering sheet attached.

Fig. 1(C) is a plan view of the urine-absorbent pad shown in **Fig. 1(B)**, as viewed from the backing layer, with the covering sheet removed.

Fig. 2 is a perspective view which illustrates how the urine-absorbent pad of **Fig. 1(A)** is used in combination with a disposable diaper.

Fig. 3 is a plan view which illustrates how the urine-absorbent pad shown in **Fig. 1(A)** is used in combination with a disposable diaper.

Fig. 4 is a schematic sectional view taken along the line IV-IV in **Fig.**

3.

Fig. 5 is a perspective view of the urine-absorbent pad shown in **Fig. 1(A)** which is folded for use by a man, with its shape so modified as to enclose a penis.

Fig. 6(A) is a plan view of a urine-absorbent pad as another example of the absorbent article according to the invention, as viewed from a backing layer, with a covering sheet attached.

Fig. 6(B) is a plan view of the urine-absorbent pad shown in **Fig. 6(A)**, as viewed from the backing layer, with the covering sheet removed.

Figs. 7(A) and 7(B) are perspective views of examples of openings.

Fig. 8(A) is a plan view of a urine-absorbent pad as another example of the absorbent article according to the present invention, as viewed from a backing layer, with a covering sheet attached.

Fig. 8(B) is a plan view of the urine-absorbent pad shown in **Fig. 8(A)**, as viewed from the backing layer, with the covering sheet removed.

Fig. 9 is a plan view of another embodiment of the urine-absorbent pad shown in **Fig. 8(A)**, with the covering sheet removed.

DETAILED DESCRIPTION OF THE INVENTION

A urine-absorbent pad, as an example of one embodiment of the absorbent article according to the invention, is shown in **Fig. 1(A)** (perspective view), **Fig. 1(B)** (plan view as viewed from a backing layer, with a covering sheet attached), and **Fig. 1(C)** (plan view as viewed from the backing layer, with the covering sheet removed).

The urine-absorbent pad **20** comprises a liquid-permeable facing layer **21** which faces the wearer in use, and a backing layer **22**, which faces a disposable diaper in use, and an absorbent core **23** which is interposed between the two layers.

The facing layer **21** can be made from a nonwoven fabric of hydrophilic fibers, hydrophobic fibers containing a hydrophilic surfactant, or the like,

which can be formed by various processes such as point bonding, through-air bonding, spun bonding, or spun lacing.

The backing layer **22** is made of a liquid-impermeable, breathable sheet of resin, such as polyolefin.

The absorbent core **23** is formed from crushed pulp or a mixture of crushed pulp and SAP (super-absorbent polymer), and is covered with an absorbing sheet **23a** such as tissue. (See **Fig. 4**.) The SAP can be made of polyacrylic acid, sodium polyacrylate, polyacrylamide, polyacrylonitrile, polyvinyl alcohol, an addition polymer of maleic anhydride, a polyether, a condensed polymer, a polysaccharide such as starch or cellulose, a protein such as collagen and the like. Examples of the SAPs include cross-linked compound of sodium polyacrylate, graft copolymer of starch having sodium polyacrylate and graft copolymer of cellulose having polyacrylonitrile chains.

The absorbent core **23** is rectangular in shape as indicated by the dotted lines in **Figs. 1(B)** and **1(C)**. It may also take on an hourglass shape. With the absorbent core **23** interposed, the facing layer **21** and the backing layer **22** are bonded together with a hot-melt adhesive, or the like, along the periphery of the absorbent core **23**.

As used herein, the “absorbing area” refers to the area which is surrounded by the dotted lines in **Figs. 1(B)** and **1(C)** and the area of the absorbent core **23**.

The urine-absorbent pad **20** has elastic members **24** which are disposed between the facing layer **21** and the backing layer **22** and extend in the lengthwise direction (**Y** direction) of the urine-absorbent pad **20**. The elastic members **24** exist in side areas where the absorbent core **23** is absent (i.e., outside of the absorbing area in the widthwise direction (**X** direction) of the urine-absorbent pad **20**). The elastic members **24** are bonded to the facing layer **21** and the backing layer

22 in its stretched state in the Y direction (with a certain per cent elongation). In their free state, they shrink in the Y direction, causing the facing layer 21 and the backing layer 22 to form gathers 25 on both the side areas of the urine-absorbent pad 20 in the X direction.

5 As shown in Fig. 1(C), the backing layer 22 is made of a liquid-impermeable resin sheet and has openings 22a, through which openings the absorbing sheet 23a (e.g., tissue) covering the absorbent core 23 is exposed. In this embodiment, the openings 22a constitute liquid-passing areas indicated by (a).

10 The openings 22a (or the liquid-passing areas (a)) are arranged side by side approximately at the center of the absorbing area in the widthwise direction (X direction) and are elongated parallel to each other in the lengthwise direction (Y direction). In other words, they are situated substantially at the center of the absorbing area. The area of the openings 22a is smaller than that of the absorbing area.

15 The backing layer 22 has an adhesive layer 26 as an adhesive means. The adhesive layer 26 is formed on the backing layer 22 in such a way as to surround the openings 22a individually. This adhesive layer 26 aids in fastening a covering sheet 27 to the outside of the backing layer 22, as shown in Fig. 1(B). Thus the covering sheet 27 closes the openings 22a. In other words, the adhesive layer 26
20 surrounds the openings 22a completely, and the covering sheet 27 is bonded to this adhesive layer 26. Therefore, with the covering sheet 27 attached, the liquid-passing areas (a) are closed and the backing layer 22 of the urine-absorbent pad 20 prevents liquid from passing through.

25 The covering sheet 27 is made of a liquid-impermeable and breathable sheet of resin such as polyolefin, like the backing layer 22. The adhesive layer 26 is formed from a gum adhesive or acrylic resin, to permit the covering sheet 27 to be removed at any time from the backing layer 22, and retains a certain adhesive power even after the covering sheet 27 has been removed. When the urine-absorbent pad 20 is used in combination with a disposable diaper, the adhesive layer 26 (with the

covering sheet **27** removed) adheres to the inside of the disposable diaper, thereby preventing the urine-absorbent pad **20** from slipping out of place. In addition, because the urine-absorbent pad **20** is in contact with the disposable diaper, the passage of urine to the disposable diaper is secured.

5 The covering sheet **27** has a tab **27a** formed at its end. This tab **27a** is not bonded to the backing layer **22**.

10 The urine-absorbent pad **20** is used in combination with a disposable diaper **1** (shown in **Figs. 2** and **3**) one over the other, with the former placed inside of the latter. The disposable diaper **1** has the shape of an hourglass and consists of a front part **1A** (faces the abdomen of the wearer in use), a rear part **1B** (faces the hip or back of the wearer in use), and a middle part **1C** (faces the groin in use).

15 The disposable diaper **1** has a liquid-permeable inner layer **2** and a liquid-impermeable outer layer **3**, with an absorbent body **4** interposed between them. The absorbent body **4**, which has the shape of an hourglass, is formed from crushed pulp or a mixture of crushed pulp and SAP and is enclosed with an absorbing sheet such as tissue.

20 The middle part **1C** of the disposable diaper **1** has longitudinally extending elastic bodies **5** at its side edges and between the inner layer **2** and the outer layer **3**, so that the elastic bodies **5** form gathers **6** when they shrink.

25 The inner layer **2** of the rear part **1B** has fasteners (hooks) **7** at its edges. The outer layer **3** of the front part **1A** also has fasteners (piles) **8**. To wear the disposable diaper **1**, the fasteners **7** and **8** are engaged with each other around the waist of the wearer.

30 Although the disposable diaper **1** described herein is an example of the open type, the urine-absorbent pad **20** of the invention may also be used in combination with a disposable diaper of the pants type in which the front part **1A** and the rear part **1B** are bonded together at their edges.

35 If the user can frequently change the absorbent pad, for example, during the daytime, the urine-absorbent pad **20** is used with the covering sheet **27**

attached. In this embodiment, as shown in **Fig. 1(B)**, the openings **22a** in the backing layer **22** remain closed by the covering sheet **27** which is fixed by the adhesive layer **26** formed around the openings **22a**. Therefore, the openings **22a** (liquid-passing areas (**a**)) are completely closed and urine does not leak from the urine-absorbent pad **20** through the openings **22a**.

The urine-absorbent pad **20** is placed on the inner layer **2** of the disposable diaper **1**, with the backing layer **22** facing the disposable diaper **1**, as shown in **Figs. 2** and **3**. In this embodiment, to prevent the urine-absorbent pad **20** from slipping out of place, the backing layer **22** may be provided with another adhesive layer **28** as another adhesive means which does not face the covering sheet **27**, as shown in **Fig. 1(B)**, and adheres to the inner layer **2** of the disposable diaper **1**. Alternatively, the adhesive layer **28** may be formed on the covering sheet **27**. In this case, the adhesive force by the adhesive layer **28** between the covering sheet **27** and the inner layer **2** should be weaker than the force by the adhesive layer **26** between the backing layer **22** and the covering sheet **27**, so that the covering sheet **27** will not accidentally be removed from the urine-absorbent pad **20** when the urine-absorbent pad **20** is removed from the disposable diaper **1**.

The urine-absorbent pad **20**, with the covering sheet **27** attached, functions in the same way as a conventional urine-absorbent pad. If the absorbent core **23** has a capacity to absorb about 300 cc of urine, there will be little leakage from the urine-absorbent pad **20** after urinary incontinence (one or two episodes), assuming that about 150 cc of urine is excreted each time. If the urine-absorbent pad **20** is replaced whenever incontinence occurs, little or no urine reaches the absorbent body **4** of the disposable diaper **1**. Thus, the disposable diaper **1** can be used continuously without being soiled.

Alternatively, when the ability to change the urine absorbent pad is limited, for example, during periods of sleep, the urine-absorbent pad **20** is placed on the disposable diaper **1** (as shown in **Figs. 2** and **3**), with the covering sheet **27** removed (as shown in **Fig. 1(C)**). The covering sheet **27** can be removed easily by

pulling the tab **27a** projecting from it as shown in **Fig. 1 (B)**. After the covering sheet **27** has been removed, the adhesive layer **26** on the backing layer **22** is exposed and adheres to the inner layer **2** of the disposable diaper **1**, thereby preventing the urine-absorbent pad **20** from slipping out of place. Incidentally, if the adhesive layer **28** is formed on the backing layer **22**, it also helps the urine-absorbent pad **20** to adhere to the disposable diaper **1**.

When the covering sheet **27** is removed, the openings **22a** in the backing layer **22** open to form the liquid-passing areas (**a**), and the absorbent core **23** is exposed through these openings **22a**. Therefore, when the urine-absorbent pad **20** is placed on the disposable diaper **1** as shown in **Fig. 3**, the absorbent core **23** faces the inner layer **2** of the disposable diaper **1** through the openings **22a**.

The flow of urine in the embodiment described above is illustrated in **Fig. 4**, which is a sectional view taken along the line IV-IV in **Fig. 3**. The absorbent core **23** of the urine-absorbent pad **20** absorbs a large portion of urine but permits any remaining urine to pass through the openings **22a** (liquid-passing areas (**a**)) in the backing layer **22** to be absorbed by the absorbent body **4** of the disposable diaper **1**. Assuming that the amount of urine is about 150 cc when incontinence occurs once, about 100 cc will be absorbed by the absorbent core **23** of the urine-absorbent pad **20** and the remaining 50 cc will be absorbed by the absorbent body **4** of the disposable diaper **1**. Upon passing through the openings **22a**, the urine moves mostly to the center of the absorbent body **4** where it is absorbed. Therefore, urine will not leak at the sides or the gathers **6** of the disposable diaper **1**.

In the case where incontinence occurs several times (e.g., more than two times) and the total amount of urine is greater than 300 cc, e.g., about 450 cc, the absorbent core **23** of the urine-absorbent pad **20** absorbs about 300 cc of urine and the absorbent body **4** of the disposable diaper **1** absorbs the remaining 150 cc of urine. Even if incontinence is more frequent, excess urine will move to the absorbent body **4** of the disposable diaper **1**. Therefore, side leakage of urine can be effectively prevented even in the case of frequent incontinence.

The absorbent core **23** of the urine-absorbent pad **20** becomes almost saturated with urine after incontinence has occurred two or three times. If the urine-absorbent pad **20** is replaced at this stage, the disposable diaper **1** is still usable because the absorbent body **4** of the disposable diaper **1** has not yet absorbed urine to its full capacity. Therefore, frequent replacement of the disposable diaper **1** can be prevented.

Two or more urine-absorbent pads **20** (with the covering sheet **27** removed) may be placed on the inner layer **2** of the disposable diaper **1**, as indicated by dotted lines in **Fig. 4**. In this embodiment, urine is absorbed by each absorbent core **23** of the urine-absorbent pad **20**. Thus, it is possible to increase the capacity for absorbing urine and to prevent soiling of the disposable diaper **1** by the urine even where there is frequent incontinence.

The urine-absorbent pad **20** described above is designed to be used in a stretched form, having a slight curve. However, it may be so folded as to enclose a penis as shown in **Fig. 5**. In this embodiment, the urine-absorbent pad **20** is folded into a cone shape with the facing layer **21** inside and the lengthwise edges overlapped. This embodiment may be accomplished by bonding the outside of one lengthwise edge of the urine-absorbent pad **20** to the inside of the other lengthwise edge of the urine-absorbent pad **20** using an adhesive layer **28** (such as double-sided adhesive tape). The penis is inserted into the conically folded pad, which pad is subsequently covered with the disposable diaper **1**.

If the pad can be changed frequently, the urine-absorbent pad **20**, which has been folded for males, is used with the openings **22a** closed by the covering sheet **27**.

When frequent changing of the pad is not available, the urine-absorbent pad **20** thus folded for males is used with the covering sheet **27** removed so that the openings **22a** of the backing layer **22** are exposed. In this case, the urine-absorbent pad **20** should be positioned such that the openings **22a**, face the inner layer **2** of the disposable diaper **1**. The result is the same as that explained above with

reference to **Fig. 4**. The excess urine which is not absorbed by the absorbent core **23** of the urine-absorbent pad **20** passes through the openings **22a** to be absorbed by the absorbent body **4** of the disposable diaper **1**. Thus, it is possible to cope with frequent episodes of incontinence.

5 In another embodiment of the absorbent article of the invention, the urine-absorbent pad may be modified as shown in **Figs. 6(A)** and **6(B)**. **Fig. 6(A)** is a plan view of the urine-absorbent pad, as viewed from the backing layer. **Fig. 6(B)** is a plan view of the urine-absorbent pad, with the covering sheet removed.

10 A urine-absorbent pad **30** shown in **Fig. 6(A)** is similar in structure to the urine-absorbent pad **20** shown in **Fig. 1(A)**. It has a facing layer and a backing layer, with an absorbent core interposed between them, and has gathers (formed by elastic members extending in the **Y** direction) on both of the side areas thereof. Therefore, it is made of the same materials and is used in the same manner as the absorbent pads described above.

15 The urine-absorbent pad **30** has a backing layer **31** which is made of liquid-impermeable resin film (such as polyolefin), similar to the backing layer **22** of the urine-absorbent pad **20**. The backing layer **31** has a number of openings **31a** which cover the absorbent core (or absorbing area) almost entirely, as shown in **Fig. 6(B)**. In other words, this embodiment is constructed such that the liquid passing area
20 (b) coincides substantially with the absorbing area (the area containing the absorbent core). Incidentally, the openings **31a** may be formed in the entire area of the backing layer **31** although they are confined to the absorbing area in the this particular embodiment.

25 Each of the openings **31a** are preferably circular, with a diameter larger than 0.5 mm, preferably larger than 1 mm. The openings **31a** are preferably arranged with a pitch greater than 1 mm, preferably greater than 1.5 mm. The advantage of establishing the size and pitch of the openings **31a** as described above is that the liquid-passing area (b) of the urine-absorbent pad **30** can be recognized visibly. This avoids the possibility of mistaking an ordinary urine-absorbent pad, in which the

backing layer does not have the liquid-passing area, for one of the invention.

In the case of the urine-absorbent pad **30** in which the openings **31a** are so formed as to cover the absorbent core (or the absorbing area) almost entirely, it is necessary to provide an adhesive layer **32** as described below to ensure proper adhesion between the backing layer **31** of the urine-absorbent pad **30** and the inner layer **2** of the disposable diaper **1**. Thus, the adhesive layer **32** is preferably formed in the absorbing area (or the area in which the absorbent core exists). Assuming that the area in which the adhesive layer **32** is formed has dimensions of **L1** by **W1**, the length **L1** (**Y** direction) should be equal to or smaller than the length **L0** of the absorbent core but greater than 50% of the length **L0**. In addition, it is preferred that the total area of the adhesive layer **32** is less than 60% of the area of the absorbent core in order to ensure the smooth flow of urine from the backing layer **31** to the disposable diaper **1**.

When the urine-absorbent pad **30** is used in combination with a disposable diaper **1** for adults, it is preferred that the area (**L1** by **W1**) of the adhesive layer **32** includes the center of the urine-absorbent pad **30** (in the widthwise direction) and the width **W1** is within the range of 40 to 50 mm. The adhesive layer **32**, formed as described above, prevents the urine-absorbent pad **30** and the disposable diaper **1** from displacing each other when they shrink in the widthwise direction (**X** direction) in the wearer's groin. In addition, the adhesive layer **32** has little tendency to stick to the wearer's skin and hair.

It is preferable for the area (**L1** by **W1**) in which the adhesive layer **32** is formed to have a distance **W2** of at least 30 mm from the edges of the adhesive layer **32** to the edge of urine-absorbent pad **30**, and a length **L2** of at least 30 mm from the edge of the adhesive layer **32** to the edge of the urine-absorbent pad **30**. The adhesive layer **32** formed in this manner has little tendency to stick to the wearer's skin and hair when the edges of the urine-absorbent pad **30** are turned up to the groin.

Incidentally, in the embodiment of the urine-absorbent pad **20** shown in Fig. 1(C), it is preferable for the adhesive layer **26** to be formed in the same region as for the adhesive layer **32**.

The openings may be positioned and shaped as shown in **Figs. 7(A)** and **7(B)**. In **Fig. 7(A)**, comparatively large round (or elliptic) holes **31b** are formed in line extending in the lengthwise direction (**Y** direction) and approximately at the center of the urine-absorbent pad. In **Fig. 7(B)**, one large hole **31c** is formed almost equal to the absorbing area (or the area in which the absorbent core exists).

Figs. 8(A) and **8(B)** show another embodiment of the absorbent article according to the present invention embodied in a urine-absorbent pad. **Fig. 8(A)** is a plan view of a urine-absorbent pad as viewed from the backing layer thereof, with the covering sheet attached. **Fig. 8(B)** is a plan view of the urine-absorbent pad as viewed from the backing layer thereof, with the covering sheet removed.

A urine-absorbent pad **40** shown in **Fig. 8(A)** is similar in structure to the urine-absorbent pad **20** shown in **Fig. 1(A)**. Thus, it contains a liquid-permeable facing layer and a backing layer, with an absorbent core interposed between them, and has gathers (formed by elastic members extending in the **Y** direction) on both of the side areas thereof. It is used in the same manner as described above.

The urine-absorbent pad **40** has a backing layer **41** which is made of liquid-permeable fiber-interlaced nonwoven fabric of hydrophobic fibers and/or hydrophilic fibers with or without water-absorbing fibers such as rayon fibers. Therefore, the backing layer **41** as a whole is permeable to liquid and constitutes the liquid-passing area.

On the backing layer **41** strips are formed of a first adhesive layer **42** which extend parallel in the lengthwise direction (**Y** direction) at certain intervals in the widthwise direction (**X** direction), as shown in **Fig. 8(B)**. The first adhesive layer **42** as a first adhesive means is formed at the center of the backing layer **41** in the widthwise direction, so that it is positioned within the absorbing area in the widthwise direction. Preferably, the total area of the first adhesive layer **42** is adequately established relative to the area of the backing layer **41** so that it will not adversely affect the liquid passing function of the backing layer **41**.

Incidentally, the coating pattern of the first adhesive layer **42** is not

limited to a striped pattern, but may take on any shape, such as, for example, dots or spirals.

In addition, the backing layer **41** has second adhesive layers **43**, as a second adhesive means, which are formed at the side areas thereof (gathers are included in the side areas) and extend in the lengthwise direction (**Y** direction). The first adhesive layer **42** and the second adhesive layers **43** allow a single covering sheet **44** to be attached to and cover the entire surface of the liquid-permeable backing layer **41**, as shown in Fig. 8(A). The covering sheet **44** is formed from a liquid-impermeable, breathable resin sheet such as polyolefin. Since the side portions of the covering sheet **44** in the widthwise direction are attached to the backing layer **41** by the second adhesive layers **43**, the covering sheet **44**, together with the backing layer **41** and the facing layer, form gathers by the shrinking force of the elastic members.

The first adhesive layer **42** preferably exhibits a prescribed adhesive force when the covering sheet **44** is removed. To accomplish this, the first adhesive layer **42** is formed by coating with a gum adhesive or acrylic resin. In contrast, the second adhesive layers **43** should have a moderate adhesive force, such that the covering sheet **44** can be removed easily by hand and should exhibit very little adhesive force once the covering sheet **44** has been removed. To accomplish this, the second adhesive layers **43** are formed from a hot-melt adhesive of EVA or polyolefin. Thus, the second adhesive layers **43** are stronger than the first adhesive layer **42** in adhering to the covering sheet **44**, but exhibit a weaker adhesive force than the first adhesive layer **42** once the covering sheet **44** has been removed.

The first adhesive layer **42** and the second adhesive layers **43**, as described above, prevent the covering sheet **44** from inadvertently being removed or peeling off, because the side portions of the covering sheet **44** are attached to the backing layer **41** by the second adhesive layers **43**. When the covering sheet **44** is removed from the backing layer **41**, the first adhesive layer **42** (in a striped pattern) appears at the center (in the widthwise direction) of the backing layer **41** and adheres to the inside of the disposable diaper **1**, thereby preventing the urine-absorbent pad

from slipping out of place. In this case, the second adhesive layers **43** exhibit very little adhesive force and therefore do not adhere to the wearer's skin or hair even when the side areas of the urine-absorbent pad **40** are facing the groin.

A third adhesive layer **45** as a third adhesive means may be formed on the covering sheet **44** as shown in **Fig. 8(A)**. When the urine-absorbent pad **40** is used with the covering sheet **44** attached, and in combination with the disposable diaper **1**, the inner layer **2** of the disposable diaper **1** is fastened (bonded) to the third adhesive layer **45** so that the urine-absorbent pad **40** stays in position. It is important that the adhesive force of the third adhesive layer **45**, when applied to the inner layer **2**, is weaker than that of the second adhesive layers **43** applied to the covering sheet **44**. This embodiment aids in preventing the covering sheet **44** from inadvertent removal from the backing layer **41** when the urine-absorbent pad **40** is removed from the disposable diaper **1**.

Another embodiment of the urine-absorbent pad **40a** is shown in **Fig. 9**, which is a plan view showing the pad with the covering sheet removed. The urine-absorbent pad **40a** is identical in structure to the urine-absorbent pad **40** described above, except that the backing layer **41** has side layers **46** which are formed from a liquid-impermeable resin sheet or from a hydrophobic, highly water-resistant nonwoven fabric and the second adhesive layers **43**, formed on the side layers **46**. That is, the side layers **46** are disposed on both side areas of the backing layer **41** in the widthwise direction and between the backing layer **41** and the covering sheet. The side layers **46** are bonded to the backing layer **41** by a hot-melt adhesive. With the covering sheet removed, the side layers **46** appear on both the side areas of the urine-absorbent pad **40a** including the gathers.

When this embodiment of the urine-absorbent pad **40a** is used with the covering sheet removed, and in combination with the disposable diaper **1**, the liquid-impermeable side layers **46** prevent urine from flowing to the disposable diaper **1**, at both side areas of the urine-absorbent pad **40a**. Consequently, urine passing through the absorbent core of the urine-absorbent pad **40a** reaches the center of the

absorbent body 4 of the disposable diaper 1. Thus, urine has little or no tendency to leak from the sides of the disposable diaper 1.

While the invention has been described in detail in its preferred embodiments, it should be understood that other embodiments may be prepared within the scope of the claims.

For example, an adhesive layer is not the only means that can be used to fasten together the urine-absorbent pad and the inner layer of the disposable diaper. It may be replaced by a mechanical means such as hooks attached to the backing layer, which engage with the nonwoven fabric of the inner layer of the disposable diaper to prevent the urine-absorbent pad from slipping out of place.

In the embodiment of the urine-absorbent pad for males only, the pad may be pre-formed in the shape of a cone or cylinder during the production process, with the liquid-passing area formed on the outside thereof.

The absorbent article of the present invention is not limited to the urine-absorbent pad, but also includes other absorbent articles, including sanitary napkins and may be used in combination with one another.

As used herein, “comprises” and all its grammatical forms specifies the presence of stated features, integers, steps or components, but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

WHAT IS CLAIMED IS:

1 1. An absorbent article to be worn inside of another absorbent
2 article, comprising a liquid-permeable facing layer which faces the wearer, a backing
3 layer in contact with another absorbent article, said backing layer being formed of a
4 liquid-impermeable sheet and having at least one opening made therein, and an
5 absorbent core interposed between the facing layer and the backing layer.

1 2. The absorbent article of Claim 1, further comprising a removable,
2 liquid-impermeable covering sheet wherein the covering sheet closes the opening.

1 3. The absorbent article of Claim 2, further comprising an adhesive
2 means on the backing layer, wherein the adhesive means contacts the covering sheet
3 thereby maintaining the covering sheet in place and provides an adhesive force after
4 the covering sheet is removed.

1 4. The absorbent article of Claim 1, wherein the opening is located
2 in an absorbing area of the absorbent core.

1 5. The absorbent article of Claim 4, wherein a plurality of the
2 openings are arranged to comprise a liquid-passing area in substantial communication
3 with the absorbing area.

1 6. The absorbent article of Claim 4, wherein a plurality of the
2 openings are arranged substantially at the center of the absorbing area.

1 7. The absorbent article of Claim 5, wherein the adhesive means is
2 located in the absorbing area.

1 8. The absorbent article of Claim 6, wherein the adhesive means is
2 located in the absorbing area, wherein the adhesive means surrounds the openings.

1 9. The absorbent article of Claim 7, wherein the adhesive means is
2 an adhesive applied to the backing layer.

1 10. The absorbent article of Claim 8, wherein the adhesive means is
2 an adhesive applied to the backing layer.

1 11. The absorbent article of Claim 3, wherein the backing layer
2 comprises another adhesive means at a position which does not face the covering sheet.

1 12. An absorbent article to be worn inside of another absorbent
2 article, comprising a liquid-permeable facing layer which faces the wearer, a liquid-
3 permeable backing layer to be applied to another absorbent article, and an absorbent
4 core interposed between the facing layer and the backing layer.

1 13. The absorbent article of Claim 12, further comprising a
2 removable, liquid-impermeable covering sheet which covers the entire surface of the
3 backing layer.

1 14. The absorbent article of Claim 13, further comprising a first
2 adhesive means and a second adhesive means, both for fastening the covering sheet
3 disposed on the backing layer, wherein the second adhesive means is located on both
4 sides of the absorbent article in the widthwise direction and the first adhesive means is
5 located closer to the center of the absorbent article in the widthwise direction than the
6 second adhesive means, wherein the first adhesive means exhibiting a stronger
7 adhesive force than the second adhesive means after the covering sheet is removed.

1 15. The absorbent article of Claim 14, wherein the first adhesive
2 means is an adhesive in a striped pattern.

1 16. The absorbent article of Claim 13, further comprising a liquid-
2 impermeable side layer disposed on both sides of the backing layer in the widthwise
3 direction and between the backing layer and covering sheet.

1 17. The absorbent article of Claim 16, further comprising a first
2 adhesive means for fastening the covering sheet disposed on the backing layer and a
3 second adhesive means for fastening the covering sheet disposed on the side layers, the
4 first adhesive means exhibiting a stronger adhesive force than the second adhesive
5 means after the covering sheet is removed.

1 18. The absorbent article of Claim 17, wherein the first adhesive
2 means is an adhesive in a striped pattern.

1 19. The absorbent article of Claim 14, wherein the covering sheet
2 comprises a third adhesive means, said third adhesive means exhibiting an adhesive
3 force to another absorbent article when the absorbent article is contacted with the
4 another absorbent article, wherein the adhesive force of the third adhesive means to the
5 another absorbent article is weaker than the adhesive force of the second adhesive
6 means to the covering sheet.

1 20. The absorbent article of Claim 17, wherein the covering sheet
2 comprises a third adhesive means, said third adhesive means exhibiting an adhesive
3 force to another absorbent article when the absorbent article is contacted with the
4 another absorbent article, wherein the adhesive force of the third adhesive means to the
5 another absorbent article is weaker than the adhesive force of the second adhesive
6 means to the covering sheet.

An absorbent article to be worn inside of another absorbent article, which has a liquid-permeable facing layer that faces the wearer, a backing layer that faces another absorbent article, the backing layer formed from a liquid-impermeable sheet and having at least one opening made therein or, alternatively, the backing layer formed from a liquid-permeable sheet, and an absorbent core interposed between the facing layer and the backing layer.

5

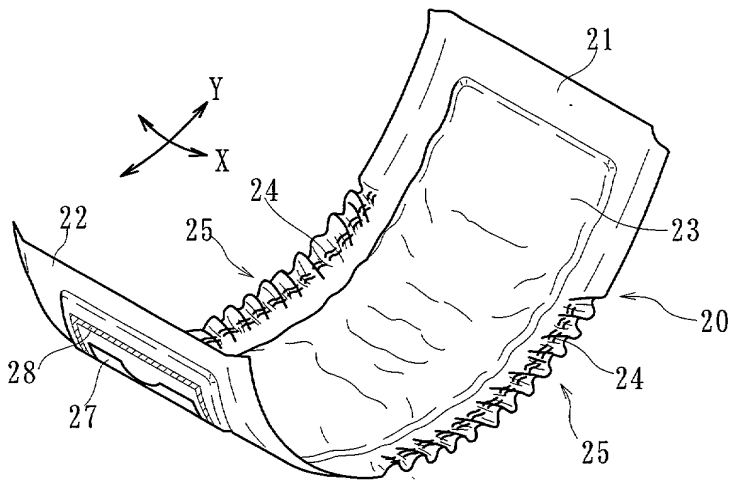


Fig. 1(A)

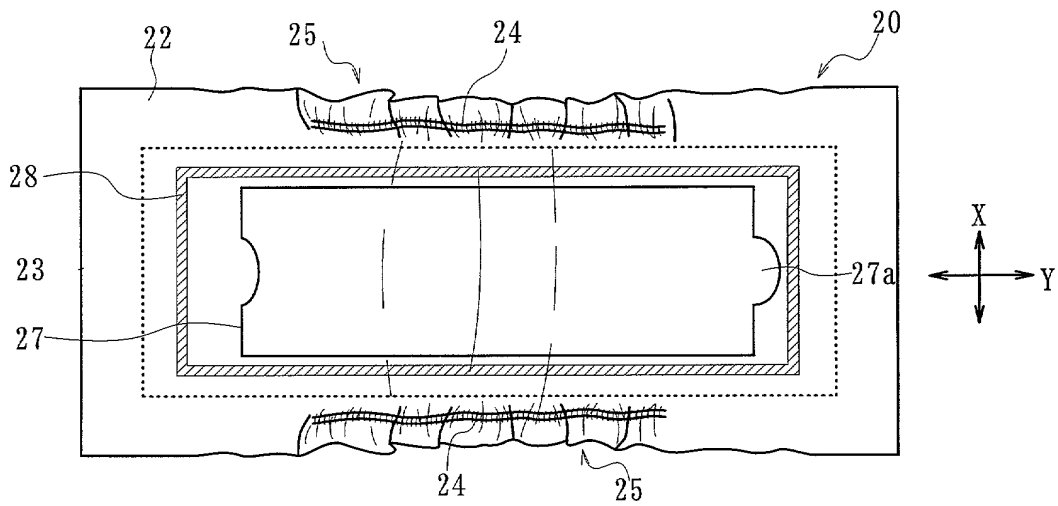


Fig. 1(B)

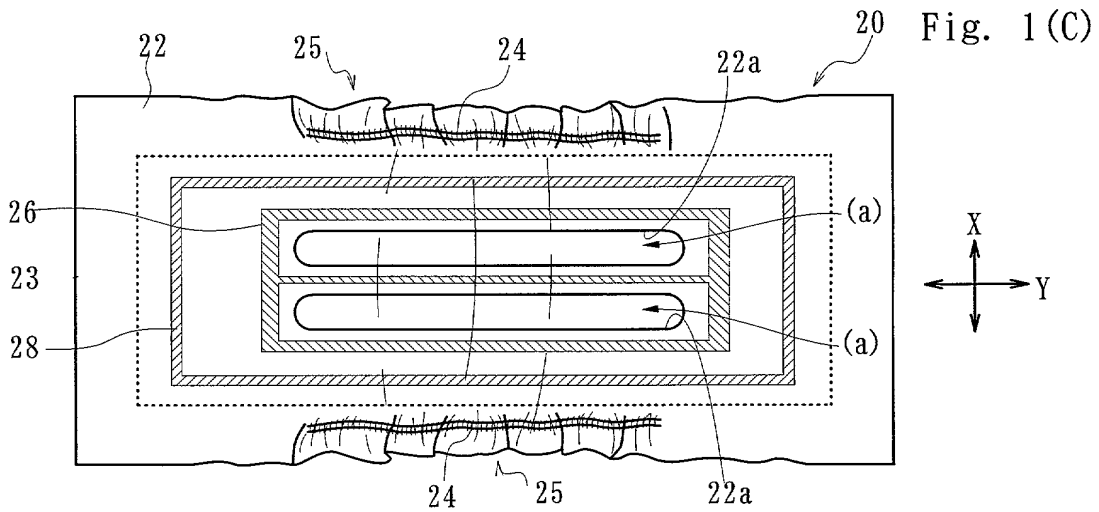


Fig. 1(C)

Fig. 2

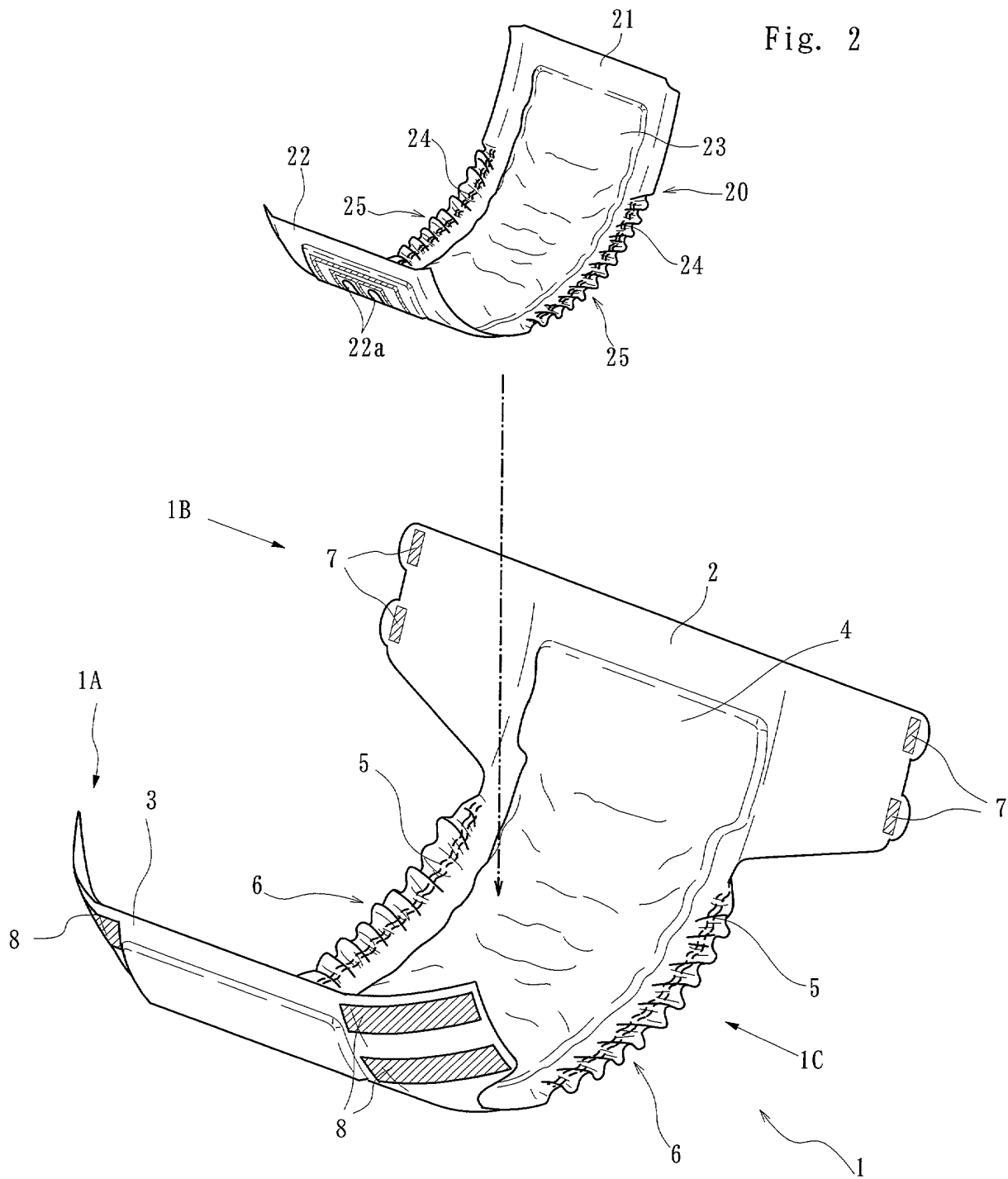


Fig. 5

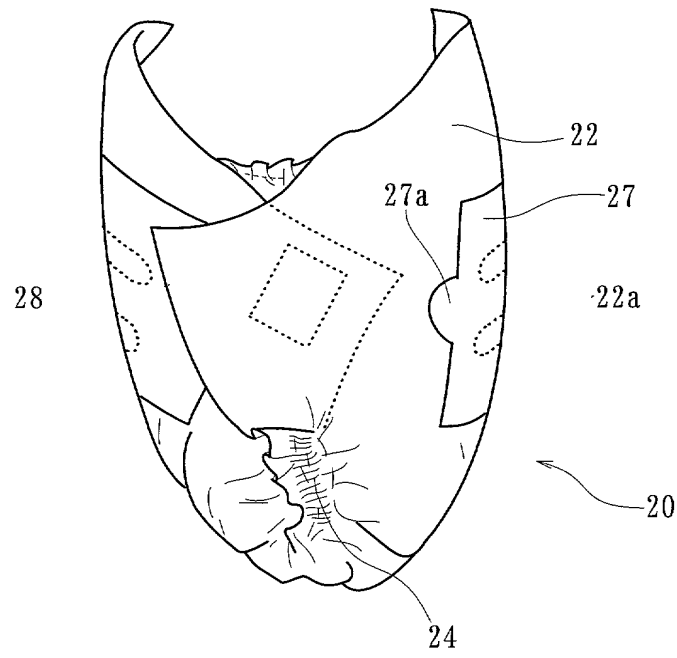


Fig. 6(A)

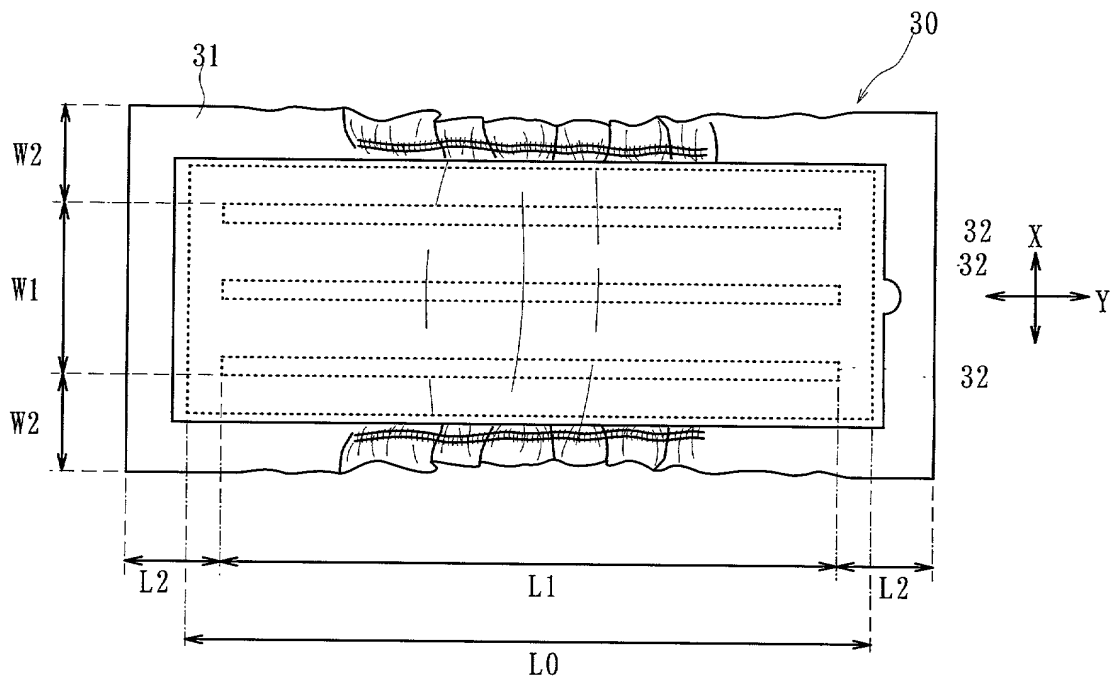
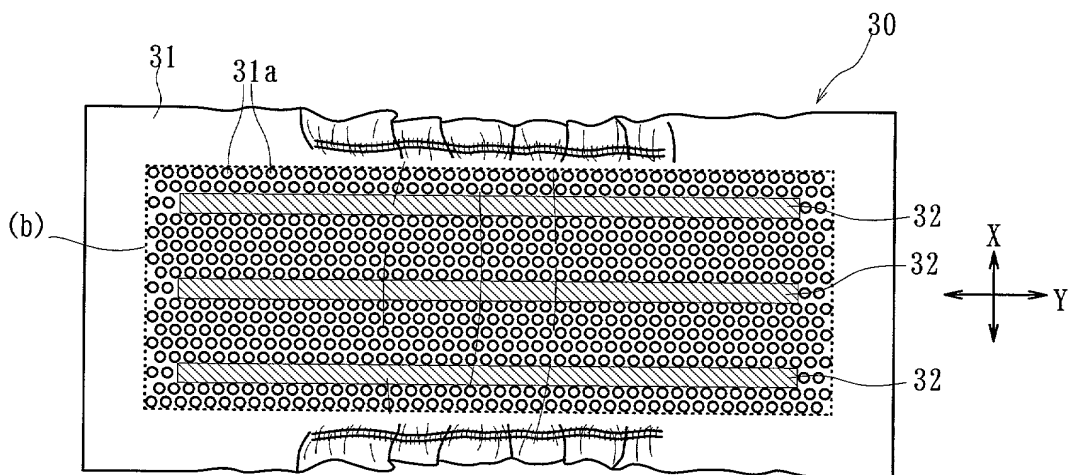


Fig. 6(B)



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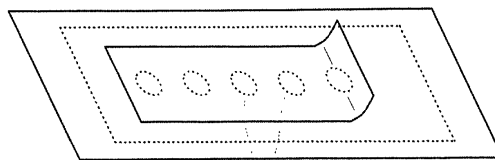
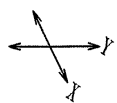


Fig. 7(A)

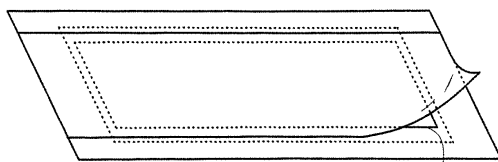
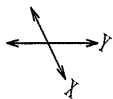


Fig. 7(B)

31c

Fig. 8(A)

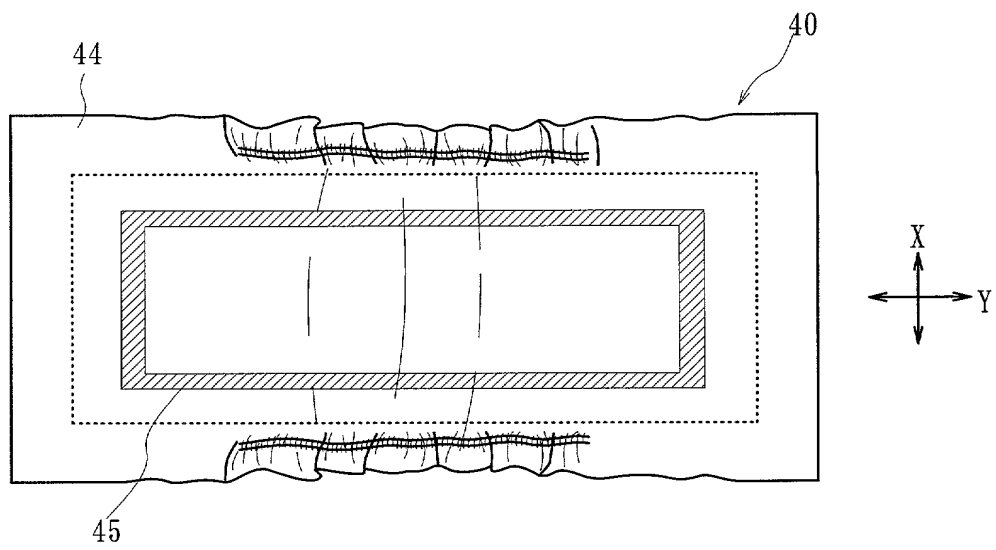


Fig. 8(B)

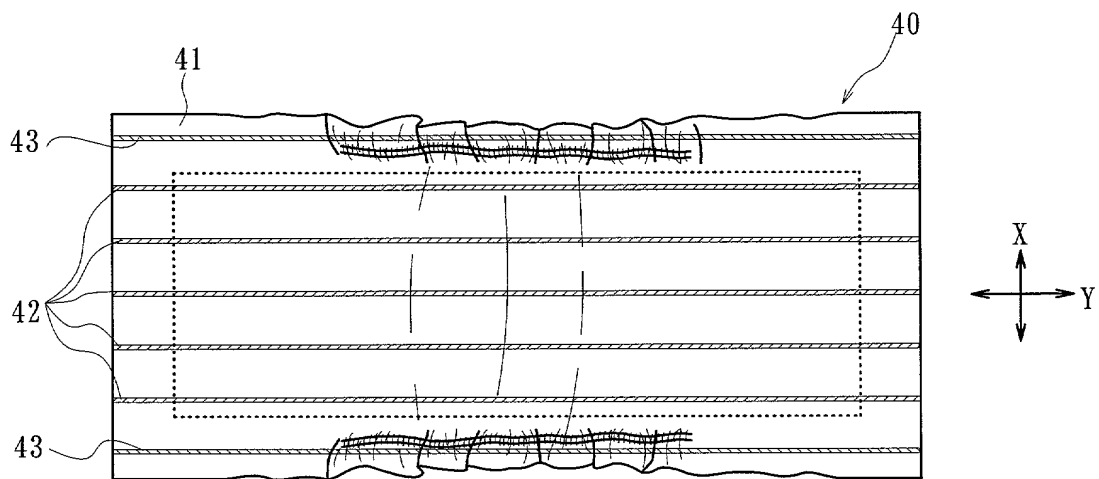
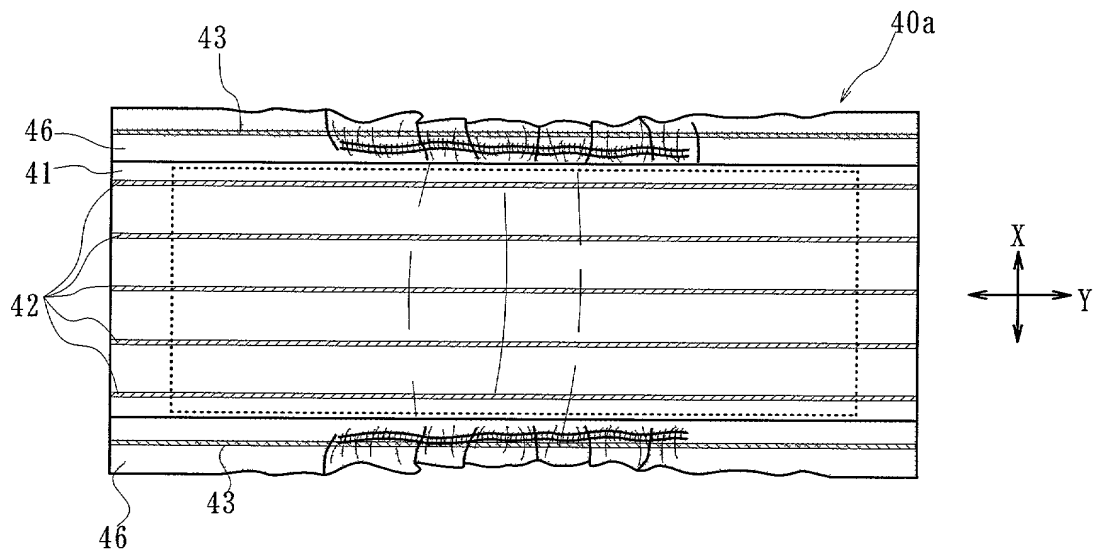


Fig. 9



**DECLARATION
AND POWER OF ATTORNEY
Original Application**

FILE NO.:
2309/OF390

As a below named inventor, I declare that the information given herein is true, that I believe that I am the original, first and sole inventor if only one name is listed at 1 below, or a joint inventor if plural inventors are named below, of the invention entitled:

ABSORBENT ARTICLE FOR PREVENTION OF SIDEWARD LEAK

which is described and claimed in:

☐ the attached specification or ☐ the specification in application
Serial No. , filed
(for declaration not accompanying appl.)

that I do not know and do not believe that the same was ever known or used in the United States of America before my or our invention thereof or patented or described in any printed publication in any country before my or our invention thereof, or more than one year prior to this application, or in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application, that I acknowledge my duty to disclose information of which I am aware which is material to patentability in accordance with 37 CFR §1.56. I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I hereby claim the priority benefits under 35 U.S.C. 119 of any application(s) for patent or inventor's certificate listed below. All foreign applications for patent or inventor's certificate on this invention filed by me or my legal representatives or assigns prior to the application(s) of which priority is claimed are also identified below.

PRIOR APPLICATION(S), IF ANY, OF WHICH PRIORITY IS CLAIMED

<u>COUNTRY</u>	<u>APPLICATION NO.</u>	<u>DATE OF FILING</u>
JAPAN	#' 98-74057	March 23, 1998
JAPAN	#' 98-74076	March 23, 1998
JAPAN	#' 98-319136	November 10, 1998

ALL FOREIGN APPLICATIONS, IF ANY, FILED PRIOR

TO THE APPLICATION(S) OF WHICH PRIORITY IS CLAIMED

COUNTRY APPLICATION NO. DATE OF FILING

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CITY:Kagawa STATE OR COUNTRY:JAPAN ZIP CODE:

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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SIGNATURE OF INVENTOR 3: 野崎 哲 DATED: Feb. 2, 1999
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TAKASHI MAENO

(D&D Forms/PTO-21)

REV. 12/87